AIC-7880

Ultra Wide PCI-to-Fast SCSI Host Adapter

User's Manual

Disclaimers

The information in this manual has been carefully checked and is believed to be accurate. AXIOMTEK Co., Ltd. assumes no responsibility for any infringements of patents or other rights of third parties which may result from its use.

AXIOMTEK assumes no responsibility for any inaccuracies that may be contained in this document. AXIOMTEK makes no commitment to update or to keep current the information contained in this manual.

AXIOMTEK reserves the right to make improvements to this document and/or product at any time and without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of AXIOMTEK Co., Ltd.

©Copyright 1998 by AXIOMTEK Co., Ltd.
All rights reserved.
July 1998, Version A1
Printed in Taiwan

Trademarks Acknowledgments

AXIOMTEK is a trademark of AXIOMTEK Co., Ltd.

Adaptec and SCSI*Select* are trademarks of Adaptec, Inc.

OS/2 and OS/2 Warp are registered trademarks of International Business Machines Corporation.

MS-DOS, Windows 3.x, Windows NT, and Windows 95 are trademarks of Microsoft Corporation.

Novell NetWare and Novell UnixWare are registered trademarks of Novell, Inc.

SCO UNIX, SCO OpenDesktop, SCO OpenServer are trademarks of Santa Cruz Operation, Inc.

Other brand names and trademarks are the properties and registered brands of their respective owners.

About this Manual

This manual contains the hardware features and software installation procedures of your AIC-7880 Ultra Wide PCI-to-Fast SCSI Host Adapter.

Chapter 1 *"Hardware"* contains the hardware features and definition of SCSI devices supported by the AIC-7880 Host Adapter.

Chapter 2 *"Software"* includes the device driver installation procedures for Novell NetWare, OS/2, Windows 95, Windows NT, SCO UNIX, and Novell UnixWare.

If you encounter any difficulty when installing the device drivers into your system, please consult AXIOMTEK engineers for proper measures and/or corrective actions to take.

Table of Contents

Chapter 1 Hardware

1.1 SCSI Configuration Guidelines 1
- 1.1.1 SCSI ID Numbers 1
- 1.1.2 SCSI Terminators 2

1.2 Installing SCSI Devices 3
- 1.2.1 Choosing SCSI Cables 3
- 1.2.2 Connecting Internal SCSI Devices 4

1.3 Configuring the Host Adapter 4
- 1.3.1 SCSI*Select* Default Settings 4
- 1.3.2 Starting the SCSI*Select* Utility 6
- 1.3.3 Using the SCSI Disk Utilities 6

1.4 Installing Device Drivers 7

Chapter 2 Software

2.1 Novell NetWare Installation 9
- 2.1.1 Calculating the Slot Number 10
- 2.1.2 Installing NetWare and the Driver 11
- 2.1.3 Updating NetWare with the Driver 14
- 2.1.4 Using the Load Command Options 15
- 2.1.5 Using startup.ncf and autoexec.ncf 19
- 2.1.6 Using SCSI Devices 20

2.2 IBM OS/2 Installation 25
- 2.2.1 Installing OS/2 and the Driver 25
- 2.2.2 Updating OS/2 with the Driver 27
- 2.2.3 Using Command Line Options 28
- 2.2.4 Using Driver Over 1 GByte 32

2.3 Microsoft Windows 95 Installation 33
- 2.3.1 Installing Windows 95 and the Driver 33
- 2.3.2 Updating Windows 95 with the Driver 34

2.4 Microsoft Windows NT Installation 35
- 2.4.1 Installing Windows NT and the Driver 35
- 2.4.2 Updating Windows NT with the Driver 38
- 2.4.3 Removing a Host Adapter 42
- 2.4.4 Swapping a Host Adapter 44

2.5 SCO UNIX Installation 45
- 2.5.1 The BTLD Process 45
- 2.5.2 Installing SCO UNIX and the Driver 46
- 2.5.3 Updating SCO UNIX with the Driver 48

2.5.4 Adding Devices with mkdev 53
2.5.5 Using Wide SCSI Host Adapters and Devices 54
2.5.6 Using Tunable Parameters for the alad Drivers 54
2.5.7 Using Drives Over 1 GByte 55
2.6 Novell UnixWare Installation 56
2.6.1 Driver Installation Process 56
2.6.2 Using Drives Over 1 GByte 57
2.6.3 Installing UnixWare and the Driver 57
2.6.4 Updating UnixWare with the Driver 61
2.6.5 Using Tunable Parameters 65
2.6.6 Using Multiple Host Adapters 65
2.6.7 Removing the Driver 66

Chapter 1
Hardware

The hardware portions on this chapter explain all hardware installation procedures in relation to the onboard Adaptec AIC-7880 Ultra Wide SCSI controller chip. Sections referring to the software describe the drivers' installation procedure of supported software application programs.

The Ultra Wide PCI-to-Fast SCSI host adapter also provides a powerful multitasking interface between your computer's PCI bus and SCSI devices (disk drives, CD-ROM drives, scanners, tape backups, removable media drives, etc.).

1.1 SCSI Configuration Guidelines

Before installing your SCSI devices, you should understand the basic SCSI concepts described in this section. The information will help you set up your host adapter and devices so they function properly.

1.1.1 SCSI ID Numbers

Each device attached to the host adapter, as well as the host adapter itself, must have a unique SCSI ID number (0 to 15 for the Ultra Wide SCSI).

We recommend that you leave the host adapter set to its default setting of SCSI ID 7. If you need to change the host adapter SCSI ID, see the *"Configuring the Host Adapter"* section for more details. To change the SCSI ID on your hard disk and other SCSI devices, refer to the device's documentation.

The host adapter supports the SCSI Configured AutoMatically (SCAM) protocol, which assigns SCSI IDs dynamically and resolves SCSI ID conflicts automatically at bootup. If your system includes SCSI disk drives or other devices that support SCAM, you do not need to manually assign SCSI IDs to these devices. To enable SCAM support, see the *"Configuring the Host Adapter"* section for more details.

Most SCSI devices currently in use, however, do not support SCAM. The SCSI IDs on these devices must be set manually. To change the SCSI IDs on these devices, refer to the device documentation.

NOTE: *If you plan to boot your computer from a SCSI device attached to the host adapter, set the Boot Target ID setting in the SCSISelect utility to correspond to the SCSI ID of the device you are booting from (See the "Configuring the Host Adapter" section for more details.).*

1.1.2 SCSI Terminators

To ensure reliable communication, the SCSI bus must be properly terminated. Termination is controlled by a set of electrical resistors, called terminators. Terminators must be placed (or enabled) at the two extreme ends of the SCSI bus. All devices that lie between the ends must have their terminators removed (or disabled).

Terminating the Ultra Wide SCSI

Termination on the Ultra Wide SCSI itself is controlled by software commands via the SCSI *Select* utility. The default setting is set to Automatic.

We recommend that you leave the Ultra Wide SCSI set to its default setting of Automatic. If you want to manually set the Ultra Wide SCSI termination setting, see the *"Configuring the Host Adapter"* section for more details. The following table lists the termination settings for manual configuration.

	Ultra Wide SCSI Termination	
Devices Connected to Ultra Wide SCSI CONNECTOR	Low	High
68-pin connector only	ON	ON
50-pin connector only	ON	ON
50-pin and 68-pin connectors	OFF	ON

Terminating SCSI Devices

Read the device's documentation to determine how to enable or disable termination on your particular SCSI device(s). On most internal SCSI devices a jumper or a switch controls the termination setting. On other internal SCSI devices you must physically remove or install resistor module(s). On most external SCSI devices, a terminating plug (a resistor pack embedded in a small plug) is installed or removed to control termination.

1.2 Installing SCSI Devices

You can connect up to a total of 15 devices (seven 8-bit internal and eight Wide (16-bit) SCSI devices, or 15 Wide SCSI devices) to the Ultra Wide SCSI.

1.2.1 Choosing SCSI Cables

Described in the following table are the cables required in connecting SCSI devices, basically determined by the type of devices you are installing.

SCSI Device Type	SCSI Cable
8-bit SCSI	50-pin SCSI cable
16-bit Wide SCSI	68-pin SCSI cable

If you purchased your Ultra Wide SCSI in AXIOMTEK, the package includes the a 50-pin and a 68-pin internal SCSI cable that allows you to connect up to two internal 50-pin SCSI devices and two internal 68-pin SCSI devices. If you are connecting more than four internal SCSI devices, you must obtain an SCSI cable with enough connectors to accommodate all of your devices.

When Fast SCSI devices are connected to the host adapter, the total length of all cables (internal and external) must not exceed 3 meters (9.8 ft.) to ensure reliable operation. If no Fast SCSI devices are connected, the total length of all cables must not exceed 6 meters (19.7 ft). See your device's documentation to determine if it is a Fast SCSI device.

1.2.2 Connecting Internal SCSI Devices

If you are connecting internal SCSI devices, make sure you have an internal SCSI cable with enough connectors to accommodate all of your devices.

1. Prepare each SCSI device for installation; configure the device SCSI ID and terminators (terminate the last internal device attached to the cable). For instructions, see the device's documentation as well as the *"SCSI Configuration Guidelines"* section at the beginning of this chapter.
2. Install the SCSI device in your computer. Refer to your computer and device documentation for instructions.
3. Plug the connector at one end of the internal SCSI cable into the host adapter's internal SCSI connector.

   Make sure the colored stripe on one side of the cable is aligned with pin-1 of the host adapter's connector. Pin-1 of the connector is usually designated by a small triangle (▲), or a "1" on the connector.
4. Plug the remaining connectors on the cable into the connectors on the backs of the devices.

   Make sure the colored stripe on the cable is aligned with pin-1 of the device's connector.
5. Connect a DC power cable (from your computer's power supply) to the power connector on the SCSI device.

1.3 Configuring the Host Adapter

The Ultra Wide SCSI includes the onboard, menu-driven SCSI*Select* configuration utility, which allows you to change host adapter settings without opening the computer or handling the board. SCSI*Select* also contains SCSI disk utilities that let you low-level format or verify the disk media of your SCSI hard disk drives.

1.3.1 SCSI*Select* Default Settings

The Ultra Wide SCSI has the default settings shown in the table on the following page. The default settings are appropriate for most PCI systems. If you do not need to change any of the default settings, there is no need to run SCSI*Select*.

Your host adapter is ready for operation and you can proceed to section *"Installing Device Drivers"*.

For situations where you might want or need to change the settings, see the descriptions of each setting in the user guide. If you need to change any of the default settings, or if you would like to format or verify a disk, see the section *"Starting the* SCSI*Select Utility"* to start the utility.

Basic Host Adapter Settings	Default
Host Adapter SCSI ID	7
SCSI Parity Checking	Enabled
Host Adapter SCSI Termination	Automatic
Boot Device Settings	**Default**
Boot Target ID	0
Boot LUN Number [1]	0
SCSI Device Settings	**Default**
Initiate Sync Negotiation	Yes (Enabled)
Maximum Sync Transfer Rate	20 MBytes/sec
Enable Disconnection	Yes (Enabled)
Initiate Wide Negotiation	Yes (Enabled)
Send Start Unit SCSI Command [2]	No (Disabled)
Advanced Host Adapter Settings	**Default**
Plug and Play SCAM Support	Disabled
Host Adapter BIOS	Enabled
Support Removable Disks Under BIOS as Fixed Disks [2]	Boot only
Extended BIOS Translation for DOS Drives > 1 GByte [2]	Enabled
Display <Ctrl-A> Message During BIOS Initialization [2]	Enabled
Multiple LUN Support [2]	Disabled
BIOS Support for More Than 2 Drives [2]	Enabled
BIOS Support for Bootable CD-ROM [2]	Enabled
BIOS Support for Int 13 Extensions [2]	Enabled
Support for Ultra SCSI Speed	Disabled

[1] Setting is valid only if Multiple LUN Support is enabled

[2] Settings are valid only if host adapter BIOS is enabled

1.3.2 Starting the SCSI*Select* Utility

You can start the SCSI*Select* utility by pressing **Ctrl-A** when the following prompt appears at boot time:

Press <Ctrl><A> for SCSI*Select* (TM) Utility!

The first menu that appears displays the options Configure/ View Host Adapter Settings and SCSI Disk Utilities.

Using SCSI*Select* Menus

SCSI*Select* uses menus to list options you can select. To select an option, use the ↑ and ↓ keys to move the cursor to the option, then press **Enter**.

In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing **Esc**. To restore the original SCSI*Select* default values, press **F6**. To toggle the display between color and monochrome modes, press **F5** (this feature may not work on some kinds of monitors).

Exiting SCSI*Select*

To exit SCSI*Select*, press **Esc** until a message prompts you to exit (if you changed any Ultra Wide SCSI settings, you are prompted to save the changes before you exit). At the prompt, select **Yes** to exit, then press any key to reboot the computer. Any changes you made in SCSI*Select* take effect after the computer boots.

1.3.3 Using the SCSI Disk Utilities

To access the SCSI disk utilities, select the SCSI Disk Utilities option from the menu that appears after starting SCSI*Select*. Once the option is selected, SCSI*Select* immediately scans the SCSI bus and displays a list of all SCSI IDs and the devices assigned to each ID.

When you select a specific ID and device, a small menu appears, displaying the options Format Disk and Verify Disk Media.

- **Format Disk:** This utility allows you to perform a low-level format on a hard disk drive. Most SCSI disk devices are preformatted at the factory and do not need to be formatted again. The Adaptec Format Disk utility is compatible with the vast majority of SCSI disk drives.
- **Verify Disk Media:** This utility allows you to scan the media of a hard disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them; if you select yes, those blocks are no longer used. You can press Esc at any time to abort the utility.

1.4 Installing Device Drivers

Some operating systems embed (include) the Ultra Wide SCSI device driver as part of their installation software. These drivers work fine with your Ultra Wide SCSI; however, the most recent version of the driver should be installed in order for your Ultra Wide SCSI to perform at its optimum level.

If you purchased your Ultra Wide SCSI in AXIOMTEK, the package includes the EZ-SCSI LITE and AIC-7880 Manager Set software.

- **EZ-SCSI LITE:** allows you to install software drivers for DOS/Windows 3.x and several additional utilities. Refer to the EZ-SCSI User's Guide.
- **AIC-7880 Manager Set:** allows you to install software drivers for NetWare, OS/2, Windows 95, Windows NT, and UNIX. Refer to Chapter 2 *"Software"*.

Chapter 2
Software

This chapter describes the installation procedure of software utilities bundled with the Ultra SCSI controller. The following sections provide the information needed to install and use the AIC-7880 manager.

NOTE: *The AIC-7880 driver supports all Adaptec 7800 Family host adapters.*

2.1 Novell NetWare Installation

This section provides the information needed to install and use the AIC-7880 manager (driver for NetWare-Novell NetWare v3.1x and v4.x. The AIC-7880 driver for NetWare supports all Adaptec 7800 Family host adapters.

AIC-7880 drivers for Novell NetWare are fully Novell NetWare Tested and Approved. The two NetWare subdirectories (*\netware\v3_1x and \netware\v4_xx*) on the AIC-7880 Manager Set diskette for NetWare contain the following files; however, the files in *\netware\v3_1x* can only be used with NetWare v3.1x, and the files in *\netware\v4_xx* with NetWare V4.x.

- **aic7870.dsk:** Adaptec's 7800 Family driver for NetWare
- **aspitran.dsk:** Adaptec's ASPI transport layer driver for NetWare
- **aspicd.dsk:** ASPI driver for CD-ROM drives

  aic7870.ddi: (NetWare V4.x only) A driver definition information file to provide setup information to NetWare during installation; NetWare can then prompt you with parameters to be configured for the device driver during the installation process
- **readme.txt:** An ASCII text file describing Adaptec's drivers for NetWare

To begin driver installation, first calculate the slot number as described in the section *"Calculating the Slot Number"*. Then, if you are performing a first-time NetWare installation, see "*Installing NetWare and the Driver"*. If the NetWare is already installed in your computer, see "*Updating NetWare with the Driver"*.

2.1.1 Calculating the Slot Number

The slot number is used to uniquely identify the AIC-7880 host adapter installed in your system. To properly load the driver for AIC-7880 host adapter, you will need to calculate the slot number in order to include it as part of the load command line. If the slot number is not included, NetWare prompts you for one.

NOTE: *During NetWare installation, the slot number (a decimal number) calculated here is interpreted by NetWare as a hex number. This hex number is then added to the load command line in the* ***startup.ncf*** *file. To correctly identify the host adapter in the* ***startup.ncf*** *file, you must change the hex number back to the original decimal slot number calculated here.*

To calculate the slot number, obtain the Bus:Device xx:xxh values identified when running the SCSI*Select* utility for your host adapter. The calculation is done manually, as described in the following steps:

1. Make sure your PCI computer system is properly set up and configured.
2. Run the SCSI*Select* utility for your host adapter. Refer to your host adapter's *User's Guide* for instructions.

   NOTE: *The host adapter light is lit during activity. If you have multiple adapters, use this light to determine which adapter* SCSI*Select is displaying information for.*

3. On the first screen of SCSI*Select*, the Bus:Device xx:xxh numbers are displayed in the upper right hand corner. Write down these numbers exactly as they appear.

   Bus refers to the PCI bus on the system. The default for Bus is 0. Usually only one PCI bus is supplied with a

system; however, systems may contain more than one PCI bus. Device refers to the physical slot number on the PCI bus. The Device number is in hex; you must convert it to a decimal number.

NOTE: *The Device slot number identified through* SCSI*Select is not the same as the slot number needed to load the driver through the load command line.*

4. Use the following formula to calculate the slot number:

   Slot Number = (Bus x 100) + Device + 16

   For example, if the Bus:Device number is 0:06h (i.e., 0:6), then the slot number is 22 (22 = (0 x 100) + 6 + 16).

2.1.2 Installing NetWare and the Driver

This section describes how to install the *aic7870.dsk* driver at the same time you install NetWare v3.1x or v4.x. If NetWare v3.1x or v4.x is already installed and you wish to install or update the *aic7870.dsk* driver, see *"Updating NetWare with the Driver"*.

Installing NetWare v4.x and the Driver

Follow these instructions only if you are installing NetWare v4.x for the first time.

1. Make backup copies of all Novell and AIC-7880 Manager Set diskettes using diskcopy, and use those backup copies as your working diskettes.
2. Boot DOS on your computer.
3. Change to the directory where the installation files are found. For a CD-ROM, the subdirectory is similar to

   d:\netware.40\english\

4. Type **install** and press **Enter**.
5. Select **Install New NetWare v4.x** if you are installing NetWare v4.x for the first time, or **Upgrade NetWare v3.1x or v4.x** if you are upgrading to NetWare v4.x.
6. Follow the instructions in the NetWare User's Manual

for partitioning, creating a server name, and checking the IPX Network number.

7. When a screen appears that asks you to select a disk driver, press **Insert**.
8. Insert the AIC-7880 Manager Set diskette for NetWare into your disk drive.
9. Press **F3** and specify the path to the aic7870.dsk driver for NetWare (e.g., *a:\netware\v4_xx*).
10. Select **AIC7870.DSK** and press **Enter**.

    NOTE: *Specify help text for each driver appears in the middle of the screen as you scroll down the list. The Loaded Drivers window below the list of available drivers displays the names of drivers that are loaded and operational. For a new install, this list is initially empty. For a selective install, the list shows the disk drivers already running.*
11. Specify the server directory (usually *c:\server.40* for *NetWare v4.02* or *c:\nwserver* for *Netware v4.10)* and press **Enter**. The install program copies the necessary files to this directory.
12. When the system displays Loading driver aic7870.dsk, Please Wait, switch to the System Console screen (Press **Alt-Esc** to switch screens).
13. You will see that the driver has prompted you for the slot number. Enter the slot number calculated for your host adapter and press Enter (See *"Calculating the Slot Number"*). You are automatically switched back to continue with installation.
14. If you are using multiple host adapters in your server, load the driver again for each host adapter.

    NOTE: *If your system has multiple host adapters, each host adapter must have its own SCSI bus. Also, follow the instructions in the host adapter's* User's Guide *for properly configuring the hardware for use with multiple adapters.*

    Refer to the *NetWare User's Manual* for information on Installing other NetWare Loadable Modules (NLMs).
15. Select **Continue the Installation** to create disk

partitions and system volumes, and to specify volume names; follow the procedures listed in the *NetWare User's Manual*.

NOTE: *To load the driver automatically at server bootup, make sure the* ***startup.ncf*** *file includes the load command line and correct the slot number for your host adapter. See "Updating NetWare with the Driver" and "Using startup.ncf and autoexec.ncf".*

Installing NetWare v3.1x and the Driver

Follow these instructions only if you are installing NetWare v3.1x for the first time.

1. Make backup copies of all Novell and AIC-7880 Manager Set diskettes using diskcopy, and use those backup copies as your working diskettes.
2. Boot DOS on your computer.
3. Change to the directory where the installation files are found. For a CD-ROM, the subdirectory is similar to

   d:\netware.312\english\

4. Type **install** and press **Enter**.

   Follow the procedures in your NetWare documentation for installing a new server.

5. When you see the NetWare colon prompt (:), use the load command to install the driver from the AIC-7880 Manager Set diskette for NetWare. You will also need the slot number described in the section *"Calculating the Slot Number"*.

   The correct syntax to load the AIC-7880 driver is

   :load [*pathname*] aic7870.dsk [*options*] slot=x

   Command line options are not case sensitive. Placing commas between command line options is optional. See *"Using the Load Command Line Options"* for possible values.

   NOTE: ***aspitran.dsk*** *must reside in the same path as* ***aic7870.dsk****, because NetWare attempts to load this file automatically.*

6. Load the driver once for each installed host adapter. If you have additional host adapters, you must load the driver again for each host adapter.

   NOTE: *To load the driver automatically at server bootup, copy the driver to the server's startup directory and modify the* ***startup.ncf****. See "Updating NetWare with the Driver" and "Using startup.ncf and autoexec.ncf".*

7. Load the NetWare *install* program from the NetWare colon prompt (:load install). Follow the instructions in the NetWare documentation to complete installation (e.g., creating disk partitions, system volumes, etc.) of your server.

2.1.3 Updating NetWare with the Driver

This section describes how to update/install the *aic7870.dsk* driver if NetWare v3.1x or v4.x is already installed. If you are installing NetWare v3.1x or v4 for the first time, see the section *"Installing NetWare and the Driver"*.

The instructions for updating/installing the driver are similar for both NetWare v3.1x or v4. Procedures that are specific to a NetWare version are noted below.

1. Make backup copies of the old driver (if it exists) before installing the new driver.
2. Copy the *aic7870.dsk* driver and *aspitran.dsk* module from the AIC-7880 Manager Set diskette for NetWare into the server's startup directory (e.g., *c:\nwserver, c:\server.40, c:\server.312*) on your hard disk. This overwrites any existing version of the drivers in the directory.

   NOTE: *For NetWare v3.1x, the* ***aic7870.dsk*** *and* ***aspitran.dsk*** *files are located in the \netware\v3_1x subdirectory on the diskette; for NetWare v4.x, the files are in \netware\v4_xx.*

3. If necessary, modify the **load** command line in the *startup.ncf* so that the proper path to the driver and the correct slot number is specified. See "*Using*

startup.ncf and autoexec.ncf".

The correct syntax to load the AIC-7880 driver is

load [*pathname*] aic7870.dsk [*options*] slot=x

Command line options are *not* case sensitive. Placing commas between command line options is optional. See *"Using the Load Command Line Options"* for possible values. To calculate the slot number for each host adapter, see *"Calculating the Slot Number"*.

4. Load the driver once for each installed host adapter. If you have additional host adapters, you must load the driver again for each host adapter.

2.1.4 Using the Load Command Options

You can specify several command line options when the driver is loaded. The available options are described in the following table.

Option	Values	Default	Description
slot=	16-41, 116-142, etc.	None	Defines host adapter device location. If none is giver, you are prompted for one. See *"Calculating the Slot Number"*.
Verbose=	y	n	Causes driver to display host adapter configuration information at load time.
removable=[1]	on, off	on	Enabled support for removable media other than CD-ROMs, which are controlled by aspicd.dsk. By default, removable media is supported. You may want to disable removable disk support in order to load an ASPI Removable Disk Module.
fixed_disk=	on, off	on	Enables support for hard disks. By default, hard disks are supported. You may want to disable fixed disk support in order to load an ASPI Fixed Disk Module.

Continued . . . . .

Option	Values	Default	Description
dev_enable=	00-FF[2]	FF	Allows you to enable the driver's registration of SCSI devices on a per target basis. A bit value of 0 causes the target not to register under the operating system. These devices are still accessible via ASPI. This enable bit mask is entered in hex (see "Bit Mask Options).
start_unit	0-FF[2]	0	A bit mask to enable Start_Unit. Command is sent only if device responds with a Not Ready Status. Most devices do not need this feature. This bit mask is entered in hex (see Bit Mask Options).
tag_disable	0-FF[2]	00	Disables tagged queuing for specific targets. Tagged queuing is enabled by default. If bit mask is set, then tagged queuing for that particular device is disabled. This disable bit mask is entered in hex (see Bit Mask Options).
lun_enable=[1]	00-FF[2]	01	A bit mask to enable scanning for specific LUNs on all targets. For example, a value of 7 would cause the driver to scan for LUNs 0, 1, and 2 on all targets. The default value of 01 causes the driver to scan LUN 0 only. For multiple LUN CDs, use the lun_enable switch on aspicd.dsf, not aic7870.dsk. This enable bit mask is entered in hex (see Bit Mask Options).
io_combine	1-32	32	Specifies maximum number of segments in a scatter/gather list.
max_sectors	1-256	256	Specifies maximum number of segments in a scatter/gather list.
max_tags	1-32	16	Specifies the maximum number of tagged commands per device.

Continued . . . . .

Option	Values	Default	Description
max_nontags	1-2	2	Specifies maximum number of nontagged commands pending per device. Only 1 command is actually sent on the SCSI bus. A value of 2 allocates a control block where the next command waits for the previous command to complete.
read_after_write	0-1	1	Specifies default verify mode; 0 = No verify on writes, 1 = Hardware verify.
instrumentation	0-1	0	If 1, enables instrumentation - variable updates at load time. The driver maintains internal instrumentation data for use by I/O Management applications. Instrumentation can also be enabled by the I/O management application., so inclusion of this option is not always necessary.

Many multiple-lun and removable media devices are changers and magazines. The aic7870.dsk driver through an ASPI driver provided by the hardware vendor only supports some of these.

On the Ultra Wide SCSI controller, these values become FFFF.

Bit Mask Options

Use this example to aid in calculating bit mask options hex values. Each SCSI device (ID 0-7 or 0-15 for the Ultra Wide SCSI) is enabled by a 1 in its corresponding bit positions. In this example, lun_enable=05 enables scanning for LUNs 0 and 2 on all targets.

Sample Load Command

Here is a sample load command with no option switches (if loaded from Drive A):

```
load a:\netware\v3_1x\aic7870
```

The resultant screen looks similar to:

```
:load a:\netware\v3_1x\aic7870        <Enter>
Loading module aic7870.dsk
   Adaptec AIC7870 manager and SCSI Disk Module
   Version 1.08    January 27, 1995
   Copyright 1995Adaptec, Inc.       All rights reserved.
   Auto-loading module ASPITRAN.DSK
   Adaptec NetWare 386 ASPI Transport Layer v1.20
   Version 1.20    October 13, 1994
Supported Slot values are 27, 29, 31
Slot: 27  <Enter>
```

Slot values that already have another registered device do not appear. Only the slots available for use by the host adapter appear on the screen.

Here is an example of the aic7870.dsk driver being loaded with command line options (if loaded from Drive A):

load a:\netware\v3_1x\aic7870 verbose=y slot=22

The resultant screen looks similar to

```
:load a:\netware\v3_1x\aic7870  verbose=y  slot=22   <Enter>
Loading module aic7870.dsk
    Adaptec AIC7870 manager and SCSI Disk Module
    Version 1.08      January 27, 1995
    Copyright 1995Adaptec, Inc.        All rights reserved.
    Auto-loading module ASPITRAN.DSK
    Adaptec NetWare 386 ASPI Transport Layer v1.20
    Version 1.20      October 13, 1994

    PCI Bus Number:          0
    PCI Device Number:       6

    Host Adapter SCSI ID:    7
    Interrupt Level:         11

    Shared Interrupts:       Enabled
    Firmware Type:           7871
    Firmware Revision:       0.0
```

2.1.5 Using startup.ncf and autoexec.ncf

The *startup.ncf* and *autoexec.ncf* files contain a set of commands that are executed at server bootup. The *startup.ncf* contains the commands to load the disk drivers. Once *startup.ncf* loads disk drivers, control is passed to the *autoexec.ncf* file to complete the boot process. For additional information on the *startup.ncf* and *autoexec.ncf* files, refer to your NetWare documentation.

To automatically load the *aic7870.dsk* at server bootup, the *startup.ncf* must contain a load command line that specifies the location of the driver on the hard disk, any available options (see *"Using the Load Command Line Options"*) and the slot number (see *"Calculating the Slot Number"*).

NOTE: *To load the driver from your hard disk, the **aic7870.dsk** driver and **aspitran.dsk** module must be copied from the AIC-7880 Manager Set diskette for NetWare to a directory on your hard disk [usually the server's startup directory (e.g., c:\nwserver\)].*

The syntax to load the *aic7870.dsk* driver is

load [*pathname*] aic7870.dsk [*options*] slot=x

For example, the command line to load the driver from the *c:\nwserver* directory, with the verbose= option *on*, and a slot number of 16 is

load c:\nwserver\aic7870 verbose=y slot=16

NOTE: *After installing the AIC-7880 host adapter, a separate load command line must be included in the **startup.ncf** file. The slot number (slot=) identifies the specific adapter.*

To modify the *startup.ncf* file, follow these steps:

NOTE: *You can also use your DOS text editor to modify the **startup.ncf** file.*

1. Type load install at the NetWare prompt and press Enter.
2. Select the appropriate menu choice that allows you to edit the startup.ncf file.
3. Make the necessary changes. When you are done,

press Esc.

2.1.6 Using SCSI Devices

This section provides procedures and tips on the following topics:

- Booting from a SCSI Device
- Formatting Media
- Using Removable media
- Using the NetWare Tape Backup
- Using a CD-ROM with NetWare
- Optimizing Performance

Booting from a SCSI Device

1. For the AIC-7880 host adapter, use the SCSI*Select* utility to configure your preferred boot device.

   When the host adapter BIOS is enabled, the host adapter can be set to scan the SCSI bus; the system boots from the first driver encountered.
2. Modify your DOS autoexec.bat file to run server from server's bootup directory.
3. Reboot your server. NetWare should bootup at this point.
4. Enter your file server name and internal IPX number.

Formatting Media (NetWare v3.1x Only)

The NetWare v3.1x *install.nlm* program lets you optionally format a disk drive for use with NetWare. When using SCSI, it allows you to low-level format several SCSI drives simultaneously.

The NetWare format procedure is not the same as using **fdisk** or **format** under DOS. You should not format a drive that contains partitions for other operating systems, as that information will be destroyed.

When you select a drive to format, *install* prompts you for an *interleave* from one to nine:

- What *install* does not day is that you can also enter an interleave value of zero. This zero interleave value instructs the drive to use its optional interleave value.
- When formatting SCSI disks or removable drives on the AIC-7880 host adapter SCSI bus, we recommend that you use an interleave value of zero.

Using Removable Media

The *aic7870.dsk* driver module fully supports removable-media disk drives, including magneto-optical drives. Removable media is treated as a standard SCSI hard disk, with some exceptions:

- The driver only recognizes and registers media with 512 bytes / sector.
- NetWare allows you to mount / dismount the media, and to lock / unlock the media.

NetWare's *monitor.nlm* program supports several removable media option. Follow these steps to view and configure these options.

1. Load monitor.nlm to display the various options.
2. Select Disk Information. All system disk drives appear.
3. Select the removable-media device. The following drive status item appear:

Menu Choice	Default Value
1. Volume Segments On Drive[1]	(select for list)
2. Read After Write Verify[1]	Hardware Level
3. Drive Light Status[1]	Not Supported
4. Driver Operating Status[1]	Active
5. Removable Drive Mount Status[2]	Mounted
6. Removable Drive Lock Status[2]	Not Locked

[1] Valid for both removable and nonremovable types of SCSI disk drives.
[2] Valid for removable media only.

Mount Status

Mounting causes a drive to come online as a NetWare storage device. Dismounted drives are inactive and cannot be accessed.

Before you eject your current media, you should first *dismount* it (menu choice 5). When the media status is *dismounted*, you can eject the media. However, NetWare does not allow you to dismount it if the media is locked.

To insert the new media, wait for the drive to spin-up, and then select the **Drive Mount** option.

Lock Status

If your removable-media device supports the Lock/Unlock feature, you can lock the media (menu choice 6). The media must be in the Not Locked state before you can eject it. If the media is Locked, it cannot be ejected when you press the **Eject** button.

Verify

Read After Write Verify (menu choice 2) is set to *Hardware Level* by default. This option cannot be specified in the *startup.ncf* or *autoexec.ncf* files. However, the default can be set on the command line, see *"Using the Command Line Options"*.

Read After Write Verify

Option Setting	Function
Disabled	All writes to SCSI disk drives are with the SCSI Write command (2Ah)
Hardware Level	All write to SCSI disk drives are with the SCSI Write and Verify command (2Eh). If not supported by the drive, behavior is the same as if Read After Write Verify is disabled.
Software Level	Not Supported

Using the NetWare Tape Backup

Included with Novell NetWare is a server-based tape backup utility called *sbackup.nlm*. This utility allows you to backup server disk drives to a server tape drive. The utility supports Adaptec host adapters.

Novell NetWare documentation contains instructions for loading the server backup software. Refer to the *NetWare Server Backup Manual* to load the *tapedai, tsa,* and *sbackup* modules.

1. Once you have loaded aic7870.dsk, load tapedai.dsk, tsaxxx.nlm (tsa312.nlm, tsa400.nlm, tsa410.nlm), and sbackup with these options:

   :load tapedai
   :load tsaxxx
   :load sbackup

   The appropriate driver that interfaces *sbackup* to ASPI is loaded automatically.

   If you are *duplexing* the AIC-7880 host adapter with another host adapter for NetWare drive *mirroring*, you must also load the appropriate ASPI manager (.dsk) for the second host adapter.

2. When sbackup is loaded, it asks for a login name. Enter the appropriate name.

3. If sbackup asks you to select the device driver, select the HP DIBI-2 Tape Driver, regardless of the type of SCSI tape drive being attached (e.g., even if the tape drive is manufactured by Wangtek, do not select the Wangtek driver).

   NOTE: *Novell also includes a driver called* ***adaptec.nlm****. This driver is not needed and should not be loaded. Adaptec's* ***aic7870.dsk*** *driver module takes advantage of ASPI interface features bypassed by* ***adaptec.nlm****.*

Novell publishes a list of SCSI tape drives supported by *sbackup.nlm*.

Using a CD-ROM with NetWare

To use a CD-ROM with NetWare v3.1x and v4.x, follow these instructions:

1. Load aic7870.dsk by entering the following line:
   :load [*pathname*] aic7870.dsk slot=x
2. Load aspicd.dsk by entering the following line
   :load [*pathname*] aspicd.dsk

   For multiple LUN CDs, enable multiple LUN scanning with the lun_enable switch (e.g., load aspicd lun_enable=FF). The lun_enable switch is not needed for *aic7870.dsk*.
3. Load cdrom.nlm by entering the following line:
   :load [*pathname*] cdrom.nlm

   NOTE: *For NetWare 4.01 and 4.02 only: You have to load **nwpa.nlm** before you can load **cdrom.nlm**.*
4. Enter the following line at the prompt and then note the number and name of the CD:
   :cd device list
5. Enter the number or volume name of the CD at the command line
   :cd mount *[x] [name]*

Optimizing Performance

The Adaptec 7800 Family SCSI Bus Master firmware increases the SCSI performance of the AIC-7880 host adapter under multitasking environments. The firmware uses a paging mechanism to handle up to 32 tagged, or 2 nontagged, SCSI commands for each SCSI device, up to a limit of 255 SCSI commands. The firmware can queue as many commands as the operating system is able to send to the host adapter. To set this feature, enter the following command:

max_tags=*n*

In general, a low number of **max_tags** gives better sequential performance, and a high number a better random performance.

NOTE: *A large number of **max_tags** can also cause starvation problems with some drives.*

2.2 IBM OS/2 Installation

This section provides the information needed to install and use the AIC-7880 Manager (driver) for OS/2 - OS/2 v2.1x and OS/2 Warp.

NOTE: *For CD-ROM installations,* ***do not*** *set the CD-ROM SCSI ID to 0 or 7.*

The following files are available on the AIC-7880 Manager Set diskette for OS/2. Normally they are in the *os2_3x* directory.

- ***readme.txt:*** An ASCII text file describing the Adaptec's 7800 Family driver for OS/2
- ***aic7870.add:*** Adaptec's 7800 Family driver for OS/2
- ***aic7870.ddp:*** Installation instructions for ***ddinstal.exe***
- ***7870pres.exe:*** The program that searches for the Adaptec's 7800 Family host adapter

If you are programming a first time OS/2 installation, see *"Installing OS/2 and the Driver"* to begin driver installation. If OS/2 is already installed in your system, see *"Updating OS/2 with the Driver"*.

2.2.1 Installing OS/2 and the Driver

This section describes how to install the *aic7870.add* driver at the same time you install OS/2 v2.1x or OS/2 Warp. If OS/2 v2.1x or OS/2 Warp is already installed and you wish to update/install *aic7870.add* driver, see *"Updating OS/2 with the Driver"*.

Installing OS/2 v2.1x and the Driver

Follow these instructions only if you are installing OS/2 v2.1x for the first time.

1. Use diskcopy to make backup copies of all IBM OS/2 and Adaptec supplied diskettes. Use the backup copies as your working diskettes.

2. Copy the os2ldr file from the AIC-7880 Manager Set diskette for OS/2 (i.e., \os2_3x\) onto the OS/2 installation diskette.
3. Copy the ibmint13.i13 and the aic7870.add files from the AIC-7880 Manager Set diskette for OS/2 (i.e., \os2_3x\) onto the OS/2 diskette # 1. This overwrites any existing version of the files included on diskette # 1.
4. Add the following line to the config.sys file on diskette ! 1:

   basedev=aic7870.add /pcihw

5. Run the OS/2 v2.1x installation program; follow the instructions in your OS/2 documentation.
6. At the end of the installation process, follow the onscreen instructions to remove the last OS/2 distribution diskette and reboot the computer.
7. After the computer has restarted, OS/2 displays a welcome screen. You have the option to view online information while the OS/2 desktop is building. Allow OS/2 to finish building.

NOTE: *Refer to the **readme.txt** file for any additional information on installing OS/2 v2.1x and the driver.*

Installing OS/2 Warp and the Driver

Follow these instructions only if you are installing OS/2 Warp for the first time.

1. Use diskcopy to make backup copies of all IBM OS/2 and Adaptec supplied diskettes. Use the backup copies as your working diskettes.
2. Copy the aic7870.add driver from the AIC-7880 Manager Set diskette for OS/2 (i.e., \os2_3x\aic7870.add) onto the OS/2 Warp installation diskette # 1.
3. Run the OS/2 Warp installation program; follow the instructions in your OS/2 documentation.

4. At the end of the installation process, follow the onscreen instructions to remove the last OS/2 distribution diskette and reboot the computer.
5. After the computer has restarted, any older versions of the aic7870.add driver existing on the hard drive must be overwritten with the newer version of the driver now available on the OS/2 Warp installation diskette # 1.

   Check the root and OS/2 directories, and any of the OS/2 subdirectories for older versions of the driver by comparing the dates of the files. If an older version is found, overwrite it with the newer version by copying the *aic7870.add* driver from diskette # 1 to the hard drive.
6. Reboot the computer.

2.2.2 Updating OS/2 with the Driver

This section describes how to update or install the *aic7870.add* driver if OS/2 v2.1x or OS/2 Warp is already installed. If you are installing OS/2 v2.1x or OS/2 Warp for the first time, see *"Installing OS/2 and the Driver"*.

Follow these instructions only if OS/2 v2.1x or OS/2 Warp is already installed. The instructions for updating or installing the driver are the same for both OS/2 v2.1x or OS/2 Warp.

1. Use diskcopy to make backup copies of all IBM OS/2 and Adaptec supplied diskettes. Use the backup copies as your working diskettes.
2. If you are updating the driver, simply copy the aic7870.add driver from the AIC-7880 Manager Set diskette for OS/2 (e.g.,\os2_3x\aic7870.add) into the \os2 directory on your hard disk. (Make a backup copy of the older driver before doing this.) This overwrites any existing version of the driver in the directory. Updating of the driver is complete; do not continue with Steps 3 through 5.

   If OS/2 has been installed and does not recognize the

AIC-7880 host adapter, or if you are adding your AIC-7880 host adapter to your OS/2 computer, you need to install the driver. To do so, continue with Step 3.

3. Run the *ddinstal* program by selecting the **Device Driver Install** icon from the system setup folder or by typing ddinstal at the OS/2 prompt.

   NOTE: *If you are running OS/2 v2.1x, change to the directory containing **aic7870.add** and associated files and run ddinstal from the OS/2 prompt.*

   CAUTION: *If you are running OS/2 v2.1x GA, do not run Device Driver Install from the System Setup folder. Instead, open a full screen OS/2 session and change to the drive with the AIC-7880 Manager Set diskette for OS/2. Then type ddinstal and press **Enter**.*

4. Insert the AIC-7880 Manager Set diskette for OS/2 in the appropriate drive and follow the prompts from ddinstal.
5. The computer scans for the host adapter(s). If a host adapter is found, the Installing Device Drivers message appears. Another message appears when the driver is successfully installed. If no host adapters are found, an error message appears.

2.2.3 Using Command Line Options

The *aic7870.add* driver is normally installed automatically and does not require any modifications to its configuration. In certain situations, however, you may wish to modify the driver to meet your specific needs, The command line options described in this section apply to both OS/2 v2.1x and OS/2 Warp.

Turn to *Example 1* and *Example 2* to see how the command line options can be used in specific installations.

Refer to your OS/2 documentation for more information on using the command line options.

CAUTION: *Your computer may not boot if you enter the command line options incorrectly.*

Add Command Syntax

The standard command line syntax for the ADD command line switches is

basedev=aic7870.add *[Universal Parameters] [Adapter ID] [Unit Parameters: [SCSI Target ID]]*

The command and switches must be placed in the *config.sys* file. Switch settings take effect after the computer is rebooted. OS/2 command line switches are not case sensitive.

Add Command Switches

The options listed in the following subsections apply to all host adapters controlled by the *aic7870.add* driver.

Replace the italicized letters (***x,y, z***, etc.) in the switch descriptions below with the SCSI target ID(s) of the device(s) that you want affected. The IDs must be separated by commas (***x,y***).

Universal Parameters

- **/et**
  Embedded targets allowed. Makes the driver assume that all targets have more than one Logical Unit Number (LUN) defined.
- **/!et**
  No embedded targets allowed. Makes the driver assume that all targets have only one LUN defined. (This is the default setting.)
- **/v**
  Verbose mode. Information such as the driver name, version number, and Adaptec copyright appears if the driver loads successfully. Also displays information about all targets found in the computer.
- **/pcihw**

PCI configuration hardware registers. Enables driver to access PCI configuration hardware registers. This switch is available for some PCI systems that run problems when trying to access PCI configuration space through PCI BIOS function calls.

Adapter ID

- **/a:*n***
  Adapter numbers are assigned based on BIOS address (starting from the lowest first) and then **Device** number (PCI **Device number** in hex as seen at the upper right hand corner of the first SCSI*Select* screen) if the BIOS is disabled. Built-in single-channel host adapters are generally assigned ID0 (zero), as the first found adapter.

Unit Parameters

- **/dm:x,y,z**
  Enables Direct Access Storage Device (DASD) manager support. Allows *os2dasd.dmd* to control the specified target(s) when they are identified as DASD devices. (This is the default setting.)
- **/!dm:x,y,z**
  Disables DASD manager support. Prevents *os2dasd.dmd* from controlling the specified target(s).

  CAUTION: *Do not remove DASD manager support from the boot drive, or the computer will not be able to boot.*
- **/sm:x,y,z**
  Enables SCSI manager support for the target device(s) ***x,y,z***. Allows *os2scsi.dmd* to control the specified target(s) if they are identified as non-DASD SCSI devices. All SCSI hard drives are controlled by *os2dasd.dmd*. (This is the default setting.)
- **/!sm:x,y,z**
  Disables SCSI manager support. Prevents *os2scsi.dmd* from controlling the specified target(s).
- **/tag:x**
  Specifies the maximum number of tagged commands for all target devices on the host adapter (1-16). A value of 1 disables tagged queuing. The maximum number allowed is 16. (The default is 8.)

- **/i**
  Ignores the host adapter. The driver ignores the host adapter so that another driver may control it.
- **/ur**
  Enables reporting of under runs.
- **/!ur**
  Disables reporting of under runs. (This is the default setting.)

Example 1

Suppose that you have a removable-media drive as target 3. Normally *os2dasd* allocates this device, treats it as a large floppy, and prevents you from sending any SCSI commands via another device manager. The command line below prevents *os2dasd.dmd* from accessing the target and allows *os2scsi.dmd* and *os2aspi.dmd* to share access to it:

```
basedev=aic7870.add /a:0 /!dm:3
```

Example 2

Suppose that you have a multidisk CD-ROM as target 4 on host adapter 0 and two DASD devices as targets 1 and 5 on host adapter 1. The command line below prevents *os2scsi.dmd* from accessing the CD-ROM and *os2dasd.dmd* from controlling the DASD devices. The driver searches for multiple LUNs on all devices.

```
basedev=aic7870.add /et /a:0 /!sm:4 /a:1 /!dm:1,5
```

NOTE: *There are no switches for directly controlling* ***os2aspi.dmd****, the ASPI device manager.*

Important Tips

- *os2scsi.dmd* only allocates devices when a device driver requests it., but this prevents *os2aspi.dmd* from accessing it. There is nothing in the ASPI specification regarding device allocation, so *os2aspi* must rely on other managers to fairly share targets. This should only be a problem if you have two drivers that use different managers and you want them both to access the same target at

the same time: for example, if you have two tape applications, one is using *os2scsi*, the other is using *os2aspi*, and they are both trying to access the tape at the same time.

- *Do not* disable DASD manager access to the boot drive if you are booting from your SCSI host adapter. If you do, your computer will not be able to boot.

NOTE: *The SCSI target ID is the target to which the Unit Parameters are applied. This parameter may be a single ID (d) or a list of IDs (d,d,d).*

2.2.4 Using Driver Over 1 GByte

If you are using a SCSI disk drive larger than 1 GByte on your OS/2 system, we recommend that you leave the Extended BIOS Translation feature at the default setting of *Enabled*. If you format a partition using the FAT file system, it must be within the first 1024 cylinders of the drive to ensure compatibility with DOS. However, if you are running NetWare and UNIX on the same SCSI disk drive (that is larger than 1 GByte), disable the Extended BIOS Translation feature.

Any time you change this feature from *enabled* to *disabled*, or vice versa, be sure to repartition and high-level format the drive. This statement does not apply to drives smaller than 1 GByte. See your host adapter's *User's Guide* for more details on using drives over 1 GByte.

2.3 Microsoft Windows 95 Installation

This section provides the information needed to install and use the AIC-7880 Manager (driver) for Windows 95.

The AIC-7880 Manager Set diskette for Windows 95 contains the files needed for driver installation. The Windows 95 subdirectory (l*win95*) on the diskette contains the following files:

- ***aic78xx.mpd:*** AIC-7880 driver for Widows 95
- ***aic78xx.inf:*** A file used by Windows 95 Setup for driver installation
- ***readme.txt:*** An ASCII text file describing the AIC-7880 driver for Windows 95

If you are performing a first time Windows 95 installation, see *"Installing Windows 95 and the Driver"*. If Windows 95 is already installed in your system, see *"Updating Windows 95 with the Driver"*.

2.3.1 Installing Windows 95 and the Driver

A version of the aic78xx.mpd driver is embedded (included) in the Windows 95 installation CD. During a normal Windows 95 installation, the AIC-7880 host adapter is detected in your system and the embedded *aic78xx.mpd* driver is automatically installed. Once the Windows 95 installation is complete, you can update the *aic78xx.mpd* driver with the most recent version of the driver by following the instructions in *"Updating Windows 95 with the Driver"*, below.

NOTE: *If Windows 95 installation cannot detect the AIC-7880 host adapter installed in your computer, you must install the* ***aic78xx.mpd*** *driver manually once Windows 95 installation is complete. To determine if the* ***aic78xx.mpd*** *driver was installed, and to install the driver manually, see "Updating Windows 95 with the Driver", below.*

2.3.2 Updating Windows 95 with the Driver

This section describes how to update / install the *aic78xx.mpd* driver if Windows 95 is already installed. If you are installing Windows 95 for the first time, see *"Installing Windows 95 and the Driver"*, above.

1. Start Windows 95.
2. Click the Start button on the Windows 95 task bar, and then point to Settings.
3. Click Control Panel.
4. Double-click the system icon.
5. On the Device Manager tab, click the plus sign next to the SCSI controller icon.

   NOTE: *If Windows 95 cannot determine the type of host adapter installed in your computer, a yellow question mark labeled* ***Other devices*** *appears instead of the SCSI controller icon. To continue, click the plus sign next to the question mark; a yellow question mark labeled* ***PCI SCSI BUS Controller*** *then appears.*

6. Double-click the AIC-7880 host adapter you wish to update, or if a yellow question mark labeled PCI SCSI Bus Controller is displayed, double-click the question mark.
7. On the Driver tab, click Change Driver. You may be asked to select the hardware type; if asked to do so, select SCSI Controller.
8. Click the Have Disk button and enter a:\win95 as the location to copy the manufacturer's file from.
9. Click OK.
10. Select the AIC-7880 host adapter, and click OK.
11. Click OK. The drover is copies and scanned.
12. You must restart your computer for the changes to take effect. Click Yes to restart your computer. Click No to return to the system properties window.

2.4 Microsoft Windows NT Installation

This section provides the information needed to install and use the AIC-7880 Manager (driver) for Windows NT - Windows NT v3.1 and v3.5x.

The AIC-7880 Manager Set diskette for Windows NT contains the files needed for driver installation. The two Windows 95 subdirectories (*\winnt\3_1 and \winnt\3_5*) on the diskette both contain the following files; however, the files in *\winnt\3_1* can only be used with Windows NT v3.1, and the files in *\winnt\3_5* with Windows NT v3.5x:

- ***aic78xx.sys:*** AIC-7880 driver for Widows NT
- ***oemsetup.inf:*** A file used by Windows NT Setup for driver installation
- ***readme.txt:*** An ASCII text file describing the AIC-7880 driver for Windows NT

If you are performing a first time Windows NT installation, see *"Installing Windows NT and the Driver"*. If Windows NT is already installed in your system, see *"Updating Windows NT with the Driver"*.

2.4.1 Installing Windows NT and the Driver

This section describes how to install the *aic78xx.sys* driver at the same time you install the Windows NT v 3.1 or v3.5x. If Windows NT v 3.1 or v3.5x is already installed and you wish to install or update the *aic78xx.sys* driver, see *"Updating Windows NT with the Driver"*.

Installing Windows NT v3.1 and the Driver

Follow these instructions only if you re installing Windows NT v 3.1 or v3.5x for the first time. You may install Windows NT from a floppy drive or from a CD-ROM drive; whichever you choose, make sure the hardware installation is completed prior to following these steps:

1. If you choose to install Windows NT from a floppy drive, locate the Windows NT Disk 1 for Floppy Installation.

If you are installing from a CD-ROM drive, locate the Windows NT Setup Disk for CD-ROM Installation.

2. Put the diskette into Drive A: (not Drive B:) and turn ON your computer.
3. When prompted, select Custom setup.

   CAUTION: *If you choose Express setup, the installation process is unable to detect your Adaptec host adapter and the installation fails.*

4. Windows NT Setup displays all recognized host adapters. If no host adapters are installed, Windows NT Setup displays none. Press S to configure additional SCSI adapters.
5. From the list of additional SCSI adapters, select Other and press Enter. (Requires disk provided by a hardware manufacturer).
6. Insert the AIC-7880 Manager Set diskette for Windows NT into Drive A: and press Enter.
7. The screen displays the adapter drivers supported on the diskette. Use the down arrow to select Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1 and press Enter.
8. If you want to add other host adapters (that are not a part of Adaptec's 7800 Family), do so at this time by repeating Step 5 for each additional adapter and inserting the appropriate disk provided by the hardware manufacturer. All Adaptec 7800 Family host adapters use the same driver; it is not necessary to install the aic78xx.sys driver again.
9. Press Enter to continue with the Windows NT operating system setup. Follow the instructions given onscreen and in the Windows NT installation documentation.

Installing Windows NT v3.5x and the Driver

An older version of the *aic78xx.mpd* driver is embedded (included) in the Windows NT v3.5x installation disks (or CD).

We recommend first installing the embedded driver by following the instructions in your Windows NT v3.5x documentation for a normal Windows NT installation. Once the Windows NT installation is complete, you can update the *aic78xx.sys* driver by following the instructions in *"Updating Windows NT with the Driver"*.

NOTE: *During a normal Windows NT installation, the AIC-7880 host adapter is detected in your system and the embedded* ***aic78xx.sys*** *driver is automatically installed.*

If you are booting from AIC-7880 host adapter and you are unable to install the embedded *aic78xx.sys* driver by performing a Windows NT installation, then follow the instructions here to complete a *fresh* Windows NT installation and install the *aic78xx.sys* driver from the AIC-7880 Manager Set diskette for Windows NT.

You may install Windows NT from a floppy drive or from a CD-ROM, whichever you choose, make sure the hardware installation is completed prior to following these steps.

1. If you choose to install Windows NT from a floppy drive, locate the Windows NT Disk 1 for Floppy Installation.

   If you are installing from a CD-ROM drive, locate the Windows NT Setup Disk 1 for CD-ROM Installation.
2. Put the diskette into Drive A: (not Drive B:) and turn ON your computer. When prompted, insert Windows NT Disk 2.
3. From the Welcome to Setup Screen, press Enter to setup Windows NT.
4. When prompted, select Custom setup.

   CAUTION: *If you choose Express setup, the embedded* ***aic78xx.sys*** *driver included with Windows NT will be loaded and not the most recent version of driver available from the AIC-7880 Manager Set diskette for Windows NT.*
5. Press S to skip mass storage device detection. This allows you to manually select the driver for your host

adapter.

6. Since mass storage device detection was skipped in the previous step, Windows NT Setup displays none in the list of recognized devices. Press S to configure additional SCSI adapters.

7. From the list of additional SCSI adapters, expand the list, select **Other** and press **Enter**. (Requires disk provided by a hardware manufacturer).
8. Insert the AIC-7880 Manager Set diskette for Windows NT into Drive A: and press Enter.
9. The screen displays the adapter drivers supported on the diskette. The Adaptec AHA-2940/AIC-78xx (PCI) NT v3.5x is highlighted by default; press Enter.
10. If you want to add other host adapters (that are not a part of Adaptec's 7800 Family), do so at this time by repeating Step 7 for each additional adapter and inserting the appropriate disk provided by the hardware manufacturer. The Adaptec 7800 Family host adapters use the same driver; it is not necessary to install the aic78xx.sys driver again.
11. Press Enter to continue with the Windows NT operating system setup. Follow the instructions given onscreen and in the Windows NT installation documentation.

2.4.2 Updating Windows NT with the Driver

This section describes how to update / install the aic78xx.sys driver if Windows NT is already installed. If you are installing Windows NT v3.1 or v3.5x for the first time, see *"Installing Windows NT and the Driver"*, above.

Updating Windows NT v3.1

Follow these instructions only if Windows NT v3.1 is already installed.

1. Select and start Windows NT Setup program. (Its icon is usually found in Main program group.) There is a brief pause while Windows NT Setup scans your hardware configuration.
2. Select the Options pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter *setup* program displays a list of all host adapters currently installed.

3. Click the **Add** button to add another host adapter type to the list. A list of additional SCSI adapters appears.
4. Expand the list of additional SCSI adapters; select Other and press Enter. (Requires disk provided by a hardware manufacturer).
5. Insert the AIC-7880 Manager Set diskette for Windows NT into Drive A: and press Enter.
6. Enter the path to the installation files by typing

   a:\winnt\3_1

7. The screen displays the adapter drivers supported on the diskette. Use the down arrow to select Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1x and click OK. The driver is added to the list of SCSI adapters.
8. Select Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1x from the list of SCSI adapters and click Install.

   At this point, Windows NT Setup checks to see if the specified driver (in this example, *aic78xx.sys*) has already been copied to the system disk.
9. If the following message appears, click **New** to replace the existing driver and skip to step 11.

   The SCSI Adapter selected is already installed

   If the following message appears, continue with Step 10:

   Please enter the full path to the Windows NT SCSI Adapter files
10. Change the path to the directory (i.e., a:\winnt\3_1) with the desired device driver, then click **Continue**.

    The device driver is copied to your system disk and the Windows NT configuration is updated so that the new device driver loads when Windows NT reboots.
11. When the installation is complete, Windows NT Setup again displays a list of currently installed host adapter types. Verify that the new host adapter appears on the list; the string should look similar to

    Adaptec AHA-2940/AIC 78xx (PCI) NT v3.1

12. Add other types of host adapters if necessary (see Step 4), or click **Close** to exit the SCSI adapters portion of Windows NT Setup, and then close the program.
13. When you see this message, click **OK** to exit:

    The changes you have made will not take effect until the computer is restarted

    If this message *does not* appear, no changes have been made to the Windows NT system configuration.
14. Restart your computer and Windows NT. It is possible that some drive letter assignments may change from the previous configuration.

    CAUTION: *If you are updating the driver that controls the boot host adapter from which Windows NT loads, you must complete the additional steps listed in "Updating the Boot Host Adapter".*

Updating the Boot Host Adapter

If the driver you are updating controls the boot host adapter from which Windows NT v3.1 loads, you must update the device driver in two locations (because Windows NT boots in a two-stage process): the Windows NT device driver directory (i.e., *\winnt\system32\drivers\aic78xx.sys*) and *c:\ntbootdd.sys*.

In the first stage of booting, no software configuration is available and Windows NT loads the device driver to control the computer boot disk from the file *c:\ntbootdd.sys*. Therefore, when you perform the steps described above to update a driver you must also explicitly copy the *aic78xx.sys* device driver to *c:\ntbootdd.sys* (meaning that *aic78xx.sys* is copied over and renamed as *c:\ntbootdd.sys*).

1. Click the **Command Prompt** icon in the Main program group.
2. Switch to the root directory of the C drive by typing

   ```
   cd\
   ```
3. Since the *c:\ntbootdd.sys* file is *system, hidden,* and

read only; you must use an attribute change program to disable the hidden and read only attributes so that the file can be modified. To disable the attributes, type

attrib ntbootdd.sys -r -h -s

4. To copy the *aic78xx.sys* device driver to *ntbootdd.sys*, type

   copy %systemroot%\system32\drivers\aic78xx.sys ntbootdd.sys

5. To change the attributes of the *ntbootdd.sys* file back to the original, type

   attrib ntbootdd.sys +r +h +s

Updating Windows NT v3.5x

6. Follow these instructions only if Windows NT v3.5x is already installed.

1. Select and start Windows NT Setup program. (Its icon is usually found in Main program group.) There is a brief pause while Windows NT Setup scans your hardware configuration.
2. Select the **Options** pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter *setup* program displays a list of all host adapters currently installed.
3. Click the **Add** button to add another host adapter type to the list. A list of additional SCSI adapters appears.
4. Expand the list of additional SCSI adapters; select Other and press Enter. (Requires disk provided by a hardware manufacturer).
5. Insert the AIC-7880 Manager Set diskette for Windows NT into Drive A: enter the following path to the installation files and then click OK.

   A:\winnt\3_5.

6. The screen displays the adapter drivers supported on the diskette. The Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1x is highlighted by default; click OK. The driver is

added to the list of SCSI adapters.

7. Select Adaptec AHA-2940/AIC-78xx (PCI) NT v3.1x from the list of SCSI adapters and click Install.

   At this point, Windows NT Setup checks to see if the specified driver (in this example, *aic78xx.sys*) has already been copied to the system disk.

8. If the following message appears, click **New** to replace the existing driver and skip to step 10.

   The driver(s) for this SCSI Adapter selected are already on the system. Do you want to use the currently installed driver(s) or install new one(s).

   If the following message appears, continue with Step 9:

   Please enter the full path to the Windows NT SCSI Adapter files

9. Change the path to the directory (i.e., a:\winnt\3_5) with the desired device driver, then click **Continue**.

   The device driver is copied to your system disk and the Windows NT configuration is updated so that the new device driver loads when Windows NT reboots.

10. When the installation is complete, Windows NT Setup again displays a list of currently installed host adapter types. Verify that the new host adapter appears on the list; the string should look similar to

    Adaptec AHA-2940/AIC 78xx (PCI) NT v3.5x

11. Add other types of host adapters if necessary (see Step 4), or click Close to exit the SCSI adapters portion of Windows NT Setup, and then close the program.

12. When you see this message, click OK to exit:

    The changes you have made will not take effect until the computer is restarted

    If this message *does not* appear, no changes have been made to the Windows NT system configuration.

13. Restart your computer and Windows NT. It is possible that some drive letter assignments may change from the previous configuration.

2.4.3 Removing a Host Adapter

Removing a host adapter can be as simple as physically removing it from the slot when your computer is shut down. Windows NT boots and functions properly in this configuration, but a warning message is generated every time you boot

Windows NT.

CAUTION: *If you have removed a host adapter but still have other host adapters of the same type installed in your computer, **do not** use Windows NT Setup to remove the device driver.*

To eliminate the warning message, you must update the Windows NT software configuration, as described in these steps:

1. Select and start Windows NT Setup program. There is a brief pause while Windows NT Setup scans your hardware configuration.
2. Select the **Options** pull-down menu and then select **Add/Remove SCSI Adapters**. The SCSI Adapter *setup* program displays a list of all host adapters currently installed.
3. Select the host adapter you want to remove and click the **Remove** button. When the Windows NT Setup program asks you for confirmation, click **OK**.

   Because the SCSI device drivers are loaded during system bootup and because they may be needed to load Windows NT itself, a screen may appear warning you that Windows NT may not start if you remove the SCSI adapter.
4. If you are sure you are removing the correct host adapter type, click OK.
5. Return to Step 3 if you want to remove driver support for other types of host adapters, or click Close to exit the SCSI adapters portion of Windows NT Setup.
6. Close the Windows NT Setup program. When the following message appears, click OK to exit:

   The changes you have made will not take effect until the computer is restarted.

   If this message *does not* appear, no changes have been made to the Windows NT system configuration.
7. Restart the computer.

   NOTE: *Windows NT Setup does not delete the device driver from your system disk; it only updates*

Windows NT software configuration information so that the device driver is no longer loaded during system bootup.

2.4.4 Swapping a Host Adapter

Swapping one type of host adapter from another is similar to the procedure for adding a host adapter. The important distinction is that you make all software configuration changes while Windows NT is running and before you make the hardware changes.

1. Install the driver for the new host adapter by following the steps in *"Updating Windows NT with the Driver"*.

   It is not essential to remove the device driver for the host adapter you are replacing. Windows NT dynamically detects the absence or presence of host adapter hardware, and no problems should arise if you leave the existing device driver installed. You may remove the device driver later, after you have successfully rebooted Windows NT. However, if you leave the driver in, the system alerts you with an error message of the extra driver every time you boot. See *"Removing a Host Adapter"*.

2. Once the new device driver is installed, shut down Windows NT and replace the existing host adapter.

3. Restart your computer and Windows NT. It is possible that some drive letter assignments may change from the previous configuration.

   NOTE: *For Windows NT v3.1 only: If the host adapter you are swapping controls the computer boot device, you must follow the additional steps in "Updating the Boot Host Adapter".*

2.5 SCO UNIX Installation

This section provides the information needed to install and use the AIC-7880 Manager (driver) for SCO UNIX - SCO UNIX 3.2v4.2, SCO UNIX OpenDesktop 3.0 (ODT3.0), SCO UNIX OpenServer 3.0, and SCO OpenServer 5.

NOTE: *If you are installing SCO UNIX products with a SCSI tape drive, set the tape drive to SCSI ID 2; if you installing with a CD-ROM, set the CD-ROM drive to SCSI ID5 as recommended by SCO.*

The following driver package is available on the AIC-7880 Manager Set diskette for SCO UNIX:

- ***alad:*** AIC-7880 driver for SCO 3.2v4.2 based products (SCO UNIX 3.2v4.2, SCO ODT 3.0, SCO OpenServer 3.0)
- ***alad325:*** AIC-7880 driver for SCO OpenServer 5

If you are performing a first time SCO UNIX installation, see *"Installing SCO UNIX and the Driver"* to begin installation. If SCO UNIX is already installed in your system, see *"Updating SCO UNIX with the Driver"*.

2.5.1 The BTLD Process

The BTLD (Boot Time Loadable Device) process is used during SCO UNIX installation to install the driver package for SCO UNIX. The process allows SCO UNIX to use Adaptec products that have not been embedded into the SCO operating system. Without the BTLD process, new hardware could not be used until their device drivers are embedded in the next SCO product release. The steps to perform the BTLD process are described in the following section.

NOTE: *SCO OpenServer 5 embeds the driver package for SCO UNIX and does not require the BTLD process.*

2.5.2 Installing SCO UNIX and the Driver

This section describes how to install the *alad* driver at the same time you install SCO UNIX 3.2v4.2, SCO ODT 3.0, or SCO OpenServer 3.0. If you are installing SCO UNIX OpenServer 5, follow the instruction provided with the SCO product to perform the initial installation (regular non-BTLD installation) of the embedded driver. If you then wish to update the embedded driver, follow the instructions in *"Updating SCO UNIX with the Driver"*.

If SCO UNIX 3.2v4.2, SCO ODT 3.0, SCO OpenServer 3.0, and SCO OpenServer 5 is already installed and you wish to install or update the driver, see *"Updating SCO UNIX with the Driver"*.

NOTE: *If you are changing the boot device from a non-SCSI hard disk to a SCSI hard disk attached to an AIC-7880 host adapter, you must reinstall SCO UNIX. If you are already booting from a SCSI hard disk and wish to boot from a SCSI hard disk attached to an AIC-7880 host adapter, you may elect to either reinstall SCO UNIX with the new driver (as described in this section), or update SCO UNIX with the new driver (see "Updating SCO UNIX with the Driver"). If you have difficulty performing the driver installation or update, see "Booting the Computer from a SCSI Drive".*

At various points in the procedures you are instructed to follow the installation procedures in the SCO manuals. After completing those procedures, return to the instructions here and continue.

NOTE: *For best results, the AIC-7880 host adapter should be the only SCSI host adapter installed in your system when you perform the installation.*

Follow these instruction only if you installing SCO UNIZ 3.2v4.2, SCO ODT 3.0, or SCO OpenServer 3.0 for the first time. The instructions for installing the driver are the same for these SCO products.

1. Insert the SCO UNIX N1 (Boot) floppy diskette into the primary floppy drive and turn ON the computer.
2. When you see this message, type the following line

and press Enter:

```
SCO UNIX System V/386
Boot
:
```

The screen then displays the following message:

```
What packages do you need linked in the system,
or 'q' to quit?:
```

NOTE: *Remember that UNIX commands are case sensitive. Enter the commands exactly as shown in the instructions.*

3. Type alad and press Enter. alad is the package name (or prefix) for the alad driver used with AIC-7880 host adapter.
4. Next, this boot line and a series of prompts similar to the following appear:

```
fd(64)unix rootfd(96) swapram(0) swaplo32 ronly mem/p
link"alad" btldfd(x)
:
Loading kernel fd(x)unix .text
:
:
```

The *x* in the prompts above represents the minor number for your floppy boot drive. *x* is found by the operating system; you do not have to enter this minor number.

5. When you see this message

```
Please insert the fd(x)alad volume and press <Return>,
or 'q' to quit:
```

insert the requested volume (AIC-7880 Manager Set diskette for SCO UNIX) and press **Enter**. Messages similar to the following appear until the driver is completely loaded.

```
alad.alad:Loading modulefd(52)/alad/driver/alad/Driver.o

.text

:
```

:

alad: Driver "alad" successfully loaded.

6. When the following message appears, remove the AIC-7880 Manager Set diskette for SCO UNIX, insert the UNIX N2 (Filesystem) diskette and press **Enter**.

   Insert N2 (Filesystem) floppy and press <Enter>

7. Turn to the appropriate SCO manual for instructions on completing an installation or upgrade of your operating system.

   NOTE: *For SCO UNIX 3.2v4.2 only: When the run-time installation is complete, make sure you select the **Install Additional Software** option. This ensures that the **Link Kit** is installed and available for later driver integration.*

   Follow the SCO manual installation instructions until you have reached and completed the Password procedure.

8. After completing the Password procedure, a message similar to the following appears:

   The BTLD packages will now be loaded to the Link Kit.

   The following packages are on this disk.

Name	Description
alad	Adaptec AIC-7870 Driver v1.7 for SCO UNIX 3.2v4.2
alad325	Adaptec AIC-7870 Driver v1.7 for SCO OpenServer 5

   Please enter the names of the packages you
   wish to install or q to quit:__
   [default: alad]

9. Type alad and press **Enter**. The *alad* driver for your AIC-7880 host adapter has been relinked to the SCO UNIX kernel.

Installation is complete.

2.5.3 Updating SCO UNIX with the Driver

This section describes how to update/install the 7800 Family driver for SCO UNIX if SCO UNIX 3.2v4.2, SCO ODT 3.0, SCO OpenServer 3.0, or SCO OpenServer 5 is already installed. If you are installing these SCO products for the first time, see *"Installing SCO UNIX and the Driver"*. The instructions for

installing/updating the driver are similar for all SCO products. Procedures that are specific to SCO versions are noted below.

CAUTION: *Improper or corrupt driver updates might destroy your existing UNIX filesystem. Back up all important files before proceeding.*

NOTE: *If you are adding an additional AIC-7880 host adapter to a system with an AIC-7880 host adapter already present, skip the "Adding Devices with mkdev". You may update the driver first by following steps 1 through 6.*

The following summarizes the procedures to install or update the driver. Complete the procedure in the order that the sections appear.

NOTE: *To update/install the driver, you must first enter the Single User Mode (System maintenance Mode).*

- ***Performing a System Backup:*** backs up the old UNIX kernel and any other important file
- ***Using the Install Package:*** Uses **installpkg** to load the driver
- ***Examining the mscsi File:*** if you want to change your primary host adapter to an AIC-7880 host adapter, replace the string **spad, ad, arad, eiad,** or other string with **alad** for host adapter Number 0 (zero) in the mscsi (SCSI configuration master table) file. The replacement causes the driver to become a permanent part of the new boot kernel on rebuild.
- ***Rebuilding the UNIX Kernel:*** Rebuilds the kernel to reflect the new changes
- ***Updating the Hardware Configuration:*** Configures the hardware using SCSI*Select* as explained in your host adapter's *User's Guide*.
- ***Booting the New Kernel:*** Reboots the computer with the new kernel

Performing a System Backup

Backup all important files on the system by following these steps:

NOTE: *To back up the whole system, refer to your SCO manuals.*

1. Login as root.
2. For SCO 3.2v4.2 based UNIX: To back up the current kernel configuration, type the following and press **Enter**:

   cp /unix /unix.orig

   For SCO OpenServer 5: To back up the current kernel configuration, type the following land press **Enter** after each line:

   umount /stand
   mount /etc/boot /stand
   cp /stand/unix /stand/unix.orig

   NOTE: *If you ever need to bootup from the pre-update kernel, load the **unix.orig** backup kernel at the UNIX Boot: prompt. To do this, type **unix.orig** and press **Enter**.*

3. This step is optional. For extra security, you may back up the *mdevice* file and the *sdevice.d* directory. Check the current directory sizes to help you decide if you want to devote the driver space to the backed-up files.

   If you want to perform this extra backup, type the following and press **Enter**.

   copy -rom /etc/conf/ /etc/conf.bak

   If you ever want to restore the previous kernel configuration, the extra backup step above ensures that the entire system configuration can be restored. If you need to restore the previous configuration, boot up from the original kernel (see *"Booting from the Old Kernel"*), type the following and press **Enter** after each line:

   mv /etc/conf /etc/conf.alad

```
mv /etc/conf.bak /etc/conf
```

Using the Install Package

1. At the UNIX system prompt, type installpkg and press **Enter**. The screen then displays these messages:

   ```
   Confirm
   Please insert the floppy disk
   :
   :
   Strike ENTER when ready
   or ESC to stop.
   ```

2. Insert the AIC-7880 Manager Set diskette for SCO UNIX and press **Enter**. The screen then displays these messages:

   ```
   Installation is in progress - do not remove the
   floppy disk.
   ```

   The following packages are on this disk:

Name	Description
alad	Adaptec AIC-7870 Driver v1.7 for SCO UNIX 3.2v4.2
alad325	Adaptec AIC-7870 Driver v1.7 for SCO OpenServer 5

   ```
   Please enter the names of the packages you wish to install or q to
   quit:__
   ```

3. At this point, type **alad** (type **alad325** for SO OpenServer 5) and press **Enter**. The screen then displays the message and various installation status prompts:

   ```
   Installing alad
   #
   ```

   The alad driver has now been loaded into the *Link Kit* for kernel addition.

Examining the mscsi File

1. Enter this command:

   ```
   cd /etc/conf/cf.d
   ```

2. Enter this Scommand to copy the file:

```
cp mscsi mscsi.org
```

3. Use a text editor to edit this file. Enter the following command if using the vi editor:

   ```
   vi mscsi
   ```

4. Search for all entries with the host adapter number 0 (zero). The host adapter number is the third column in each entry. For example:

Host Adapter Prefix	SCSI Device Type	Host Adapter No.	Target ID	Logical Unit No.	Bus[1]
xx	Stp	0	2	0	0
xx	Sdsk	0	0	0	0
xx	Srom	0	5	0	0

[1]This field applies to SCO OpenServer 5 only.

5. Modify your *mscsi* file depending on your hardware configuration:
   - If you are booting from an AIC-7880 host adapter, make sure the host adapter prefix for the host adapter number 0 is *alad*.
   - If you are booting from an AIC-7880 host adapter, make sure the host adapter prefix for the host adapter number 0 is the appropriate prefix for each device on your primary Adaptec host adapter. Save the file and exit the test editor.

Rebuilding the UNIX Kernel

1. Type the following at the # prompt and press **Enter** after each line:

   ```
   cd /etc/conf/cf.d
   ./link_unix
   ```

   Status message appears.

2. When the kernel has been built, shut down the system by typing haltsys and pressing Enter.
3. Turn OFF the system power when you are prompted to do so.

4. Continue with the section "Updating the Hardware Configuration" below.

The UNIX kernel has been prepared for the AIC-7880 host adapter operation.

Updating the Hardware Configuration

Set up the proper switches and configuration using SCSI*Select* as explained in your host adapter's *User's Guide*.

Booting the New Kernel

1. Follow the onscreen instructions to reboot your system, usually by pressing Enter.
2. Check the host adapter BIOS messages to verify that all your installed SCSI devices are listed.

   If some or all of your installed SCSI devices do not appear at this time your SCSI cables may be loose, or the SCSI device setup may not be complete. If so, go back and correct any problem before proceeding.
3. Wait for UNIX to complete bootup with the new kernel.

The *alad* driver for your AIC-7880 host adapter should now be ready for use.

2.5.4 Adding Devices with mkdev

Follow the instructions in the SCO manuals for adding devices or an AIC-7880 host adapter (to a system with a 7800 Family host adapter already present) using the **mkdev** command. Keep the following in mind:

mkdev asks for the device prefix. The AIC-7880 driver package name, *alad*, is the prefix for the host adapter.

- When the system asks for the host adapter *prefix*, type **alad** and press **Enter**.
- Refer to the *SCO UNIX Operating System Administration Guide* for additional information on **mkdev** and adding devices to your system.

2.5.5 Using Wide SCSI Host Adapters and Devices

SCO UNIX 3.2v4.2, SCO ODT 3.0, and SCO OpenServer 3.0 support SCSI IDs 0 to 7; SCSI IDs greater than 7 are not recognized. If your AIC-7880 host adapter is a Wide SCSI adapter, only 7 SCSI devices (SCSI ID 0 to 6, with the host adapter set at SCSI ID 7) can be attached and supported.

SCO OpenServer 5 supports SCSI IDs 0 to 15. If your 7800 Family host adapter is a Wide SCSI adapter, up to 15 SCSI devices can be attached and supported.

2.5.6 Using Tunable Parameters for the alad Driver

For SCO UNIX, some parameters are defined in the following file:

/etc/conf/pack.d/alad/space.c

These parameters can be tuned for the *alad* driver (prefix for the 7800 Family driver). After modifying the *space.c* file, you must rebuild the kernel for the new parameters to take effect. To following section describes how to set the tunable parameters.

Setting Parameters

If the space.c file has not been modified, all the parameters are set according to the SCSI*Select* utility for your AIC-7880 host adapter. However, you can override the parameters by modifying the *space.c* file. Changing the parameters is self-explanatory in the *space.c* file. Examples are provided in the following sections.

If you want to change the configured values, the first number indicates whether the default should be changed. If it set to 0 (zero), the parameter is set to the default. If it is set to 1, the second number is used to override the default. For example:

```
char variable = {1,22};
```

The first number is 1 which overrides the default variable with the value 22.

Examples

alad_parity[SCSI_NALAD]: specifies whether the host adapter checks parity on incoming SCSI data. If the second number is set to 0, parity checking is enabled. If it is set to 1, parity checking is disabled.

alad_parity[SCSI_NALAD] in this example you want the host adapter *not to* check parity on incoming SCSI data; define parameters as

```
alad_parity[SCSI_NALAD] = {1,0}
```

Other Information

The *alad* driver supports scatter/gather and tagged queuing; however, the *Sdsk* (SCSI disk module) driver controls whether these features are enabled or disabled. Look for the *Sdsk* driver controls in the *space.c* file. It is located at

```
/etc/conf/pack.d/Sdsk/space.c
```

2.5.7 Using Drives Over 1 GByte

SCO UNIX supports drives over 1 GByte. SCSO UNIX has no limitation with drives over 1 GByte, and recognizes the drive whether the Extended BIOS Translation feature is enabled or disabled in the SCSI*Select* utility. See the host adapter's *User's Guide* for additional information on using drives over 1 GByte.

2.6 Novell UnixWare Installation

This section provides the information needed to install and use the AIC-7880 Manager (drivers) for UnixWare - UnixWare 1.x and UnixWare 2.x.

The following driver packages are available on the AIC-7880 Manager Set diskette for UnixWare 1.x and UnixWare 2.x:

- ***adsl:*** AIC-7880 driver for UnixWare 2.x
- ***adslo:*** AIC-7880 driver for UnixWare 1.x

If you are performing a first time UnixWare installation, see *"Installing UnixWare and the Driver"* to begin installation. If UnixWare is already installed in your system, see *"Updating UnixWare with the Driver"*.

2.6.1 Driver Installation Process

The AIC-7880 driver for UnixWare is installed in one or two ways: *linked-and-integrated* with the UnixWare kernel, or *loadable* to start running after the kernel has loaded into memory.

For installations on computers that boot from a SCSI device connected to an AIC-7880 host adapter, the driver must be linked directly to the kernel. If the computer does not boot from a device connected to an AIC-7880 host adapter, the driver may be installed as loadable. Linked and loadable installations are done as follows:

- When performing a new UnixWare installation, the operating system determines whether your computer boots from the host adapter SCSI bus. The driver is automatically installed as loadable, or linked-edited with the kernel to suit your computer.
- When performing a driver *update* installation, UnixWare assumes that your computer does not boot from a device connected to the host adapter SCSI bus. If your computer *should* boot from the host adapter SCSI bus, you must perform the simple edit described in *"Modifying the New System File"*.

2.6.2 Using Drives Over 1 GByte

UnixWare 1.x does not support Extended BIOS Translation. If you have a hard drive larger than 1 GByte, you must disable this feature on your host adapter before installing or updating the driver. See the host adapter's *User's Guide* for additional information on using drives over 1 GByte.

NOTE: *After changing the setting of the Extended BIOS Translation feature, be sure to partition and high-level format the drive.*

2.6.3 Installing UnixWare and the Driver

This section describes how to install the AIC-7880 driver for UnixWare at the same time you install UnixWare 1.x or 2.x. If UnixWare 1.x or UnixWare 2.x is already installed and you wish to install or update the driver, see *"Updating UnixWare with the Driver"*.

Installing UnixWare 1.x and the Driver

Follow these instruction *only* if you installing UnixWare 1.x for the first time. Be sure to read the installation documentation included with your UnixWare distribution package and complete the following procedures in the order they appear:

- *Modifying the Advanced CMOS Setup*
- *Installing UnixWare*
- *Loading the Drivers onto the Hard Disk*

NOTE: *The UnixWare 1.x operating system supports only **eight** SCSI buses in the computer system. This means you can install no more than **eight** host adapters.*

Modifying the Advanced CMOS Setup

Follow these instructions for modifying the Advanced CMOS Setup:

1. Reboot the computer and press F1, F2, or DEL (depending on the BIOS) to enter the CMOS setup program.

2. Set all PCI channels to IRQ 10.

   NOTE: *When installing UnixWare 1.x, all installed 7800 Family host adapters must use IRQ 10 and will not work with other IRQs. When installing UnixWare 2.x, any IRQ can be used.*

   When initial installation of UnixWare 1.x is complete, the IRQ can be changed to another supported IRQ as long as there are no conflicts with the IRQ of another host adapter. The IRQ in the CMOS setup must correspond to the IRQ in the configuration table.

3. If you need to change the host adapter configuration, see the host adapter's *User's Guide* for instructions on using the SCSI*Select* utility.

Installing UnixWare

Follow these instruction to load the UnixWare operating system and *adslo* driver into memory from the UnixWare distribution media and the IHV HBA diskette (or the AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x). Refer to the *UnixWare Installation Guide* for more information.

1. Insert Diskette 1 of the UnixWare 1.x Boot Package into the floppy boot drive. boot your computer.
2. Follow the onscreen instructions to boot (usually by pressing F1). The UnixWare operating system starts to load.
3. When prompted to insert the Host Bus Adapter Drivers Diskette, insert the IHV HBA driver diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x) into the primary floppy drive and press Enter (you cannot load the adslo driver from a secondary floppy drive).As the driver loads, a message identifying the located host adapter briefly appears on screen.
4. Follow the onscreen instructions to load the UnixWare operating system. Refer to the operating system documentation and onscreen help files for help in choosing options.

- The installation program instructs you to load the second and third UnixWare and Foundation Set diskettes.
- Then the installation program instructs you to choose a media format for the Foundation Set software. If the media type for the device connected for the Foundation Set software media does not appear as a choice, the device may not have been recognized when the driver was loaded into memory.
- The UnixWare 1.x optional online explanation of the installation process can be accessed at this time. If this is your first time, the information may be valuable for you.

5. At the end of this part of the installation process you are prompted to insert the HBA Diskette(s) that you used before. Continue with the next section.

Loading the Drivers onto the Hard Disk

Follow these instructions to copy the drivers to the hard disk, and relink the kernel:

1. Insert the IHV HBA driver diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x), and press Enter.
2. Follow the instruction onscreen to finish the installation. Refer to the operating system documentation for help in choosing options.
3. Remove the IHV HBA diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x) when prompted to do so.
4. After the installation, restart the computer, login, set user-level, etc. The UnixWare operating system E-mail utility notifies you that there are messages in your mailbox.
5. Check your UnixWare mailbox for an E-mail message on the status of the installed adslo driver package.

Your UnixWare installation should now be complete.

NOTE: *If your installation fails, do not attempt to use the update installation **pkgadd** procedure to fix the installation. Follow the instructions in the UnixWare 1.x documentation and this document to retry the installation.*

Installing UnixWare 2.x and the Driver

6. Follow these instructions only if you are installing UnixWare 2.x for the first time.

1. Insert the Install Diskette of the UnixWare 2.x package into the floppy boot drive. Reboot your computer.

   Wait for the first UnixWare 2.x installation screen and prompt and then follow the onscreen instructions.
2. When prompted to wither Install Host Bus Adapter Drivers or Continue Installation, first remove the Install diskette, then select Install Host Bus Adapter Driver and press Enter.
3. Insert the HBA driver diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x) into the primary floppy drive and press Enter (you cannot load drivers from a secondary floppy drive). As the driver loads, a message identifying the located host adapter briefly appears on screen. The installation process determines which device driver on the diskettes are needed.
4. If you have additional HBA diskettes, insert the next HBA diskette, select Install Another HBA Diskette, and press Enter.

   If all of your HBA diskettes have been installed, remove the last HBA diskette, select **Continue Installation**, and press **Enter**.
5. If necessary, enter the DCU (Device Configuration Utility) to view/change the UnixWare device driver configuration data.
6. Follow the onscreen instructions to continue with installation. Refer to the operating system documentation and onscreen help files for help in

choosing options.

7. When prompted, you are asked to reinsert the specific HBA Diskette(s) that you used before.
8. Follow the onscreen instructions to complete the UnixWare installation.

NOTE: *If your installation fails, do not attempt to use the update installation **pkgadd** procedure to fix the installation. Follow the instructions in the UnixWare documentation and in this document to retry the installation.*

2.6.4 Updating UnixWare with the Driver

This section describes how to update/install the AIC-7880 driver for UnixWare if UnixWare 1.x or 2.x is already installed. If you are installing these for UnixWare 1.x or 2.x for the first time, see *"Installing UnixWare and the Driver"*. The instructions for installing/updating the driver are similar for both UnixWare 1.x and 2.x. Procedures that are specific to a UnixWare version, are noted below.

CAUTION: *Improper or corrupt driver updates might destroy your existing UnixWare file system. Back up all important files before proceeding. Consult your UnixWare manuals for proper backup procedures.*

The following is an overview of the procedures needed to install or update the driver. Complete the procedure in the order the sections appear.

- ***Backing Up the Computer:*** backs up the old UnixWare kernel and any other important files
- ***Loading the Package:*** Uses installpkg to load the AIC-7880 driver
- ***Modifying the New System File:*** For computers booting from a device connected to an AIC-7880 host adapter, modifies the new driver that was loaded in the previous procedure. Loading the driver causes the driver to become a permanent part of the new boot kernel on rebuild.

- ***Building the Loadable Modules (UnixWare 1.x Only):*** Builds the loadable module for the driver(s)
- ***Rebuilding the UnixWare Kernel:*** Rebuilds the kernel with the new driver
- ***Booting the New Kernel:*** Reboots the computer with the new kernel

NOTE: *Remember that UnixWare commands are case sensitive. Enter the commands exactly as shown here.*

Backing Up the Computer

If you have not already done so, back up all important files on the computer. Consult your UnixWare documentation for proper UnixWare file system backup procedures.

1. Login as root at the UnixWare # system prompt.
2. To back up the old UnixWare kernel, type the following and press Enter:
   cp /stand/unix /stand/unix.work

Loading the Package

1. *For UnixWare 1.x Only:* Delete the old driver by typing the following and pressing **Enter**:
   /etc/conf/bin/idinstall -d adslo
   For UnixWare 2.x Only: Delete the old driver by typing the following and pressing **Enter**:
   /etc/conf/bin/idinstall -d adsl
2. At the system prompt, type the following and press **Enter**:
   pkgadd -d diskette1
   Follow the instructions onscreen to insert the IHV HBA diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x) into the floppy boot drive.
3. For UnixWare 1.x: Select the **ihvhba** package from the onscreen menu and press **Enter**. The package is loaded into your UnixWare operating system.
   For UnixWare 2.x: Select the *adsl* package from the

onscreen menu and press **Enter**. The package is loaded into your UnixWare operating system.

4. When the package has loaded, you may be prompted to install the diskette again.

   Do not reinsert the IHV HBA diskette (or AIC-7880 Manager Set diskette for UnixWare 1.x and 2.x). Instead, type **q** (quit) and press **Enter**.

5. Type mail and press Enter. The mail messages tell you if the installation was successful.
6. Type pkginfo and press Enter.
7. Verify that the driver is now listed. The host adapter driver appears among the other installed packages.

   For UnixWare 1.x: The listing should be similar to

   system ihvhba Adaptec AIC-7870 PCI SCSI IHV HBA

   For UnixWare 2.x: The listing should be similar to

   system adsl Adaptec AIC-7870 PCI SCSI IHV HBA

Modifying the New System File

If your computer is to boot from a device connected to an AIC-7880 host adapter, follow these steps to modify the new driver system file that was loaded in the previous section.

If your computer is not to boot from the host adapter SCSI bus, and you wish to leave the driver as a loadable module, skip to *"Building the Loadable Modules (UnixWare 1.x Only)"* for UnixWare 1.x and *"Rebuilding the UnixWare Kernel"* for UnixWare 2.x.

1. Back up the adsl UnixWare configuration file. To do this, type the following and press **Enter** after each line:

   cd /etc/conf/sdevice.d
   cp adsl /save/adsl.org

2. *For UnixWare 1.x:* Use the vi text editor to remove the following line from the *adsl* configuration file

   $loadable adslo

   For UnixWare 2.x: Use the **vi** text editor to add the following line immediately below the **$version 2** line in the *adsl* configuration file

   $static

3. Display the contents of the edited *adsl* and *adslo* file by typing the following and pressing **Enter**:

   cat adsl (for UnixWare 2.x)
   cat adslo (for UnixWare 1.x)

For UnixWare 1.x: Verify that the line **$loadable adslo** is not present.

For UnixWare 2.x: Verify that the line **$static** is present immediately below the line **$version 2**.

Building the Loadable Modules (UnixWare 1.x Only)

If your computer is to boot from a device on the host adapter SCSI bus, skip to *"Rebuilding the UnixWare Kernel"*.

If your computer *is not to boot* from a device on the host adapter SCSI bus, and you left the **$loadable adsl** line in the *adsl* file, type these commands to build the loadable modules for the driver(s):

```
cd /etc/conf/bin
/idbuild/ -M adsl
```

Rebuilding the UnixWare Kernel

1. Type the following at the # prompt and press Enter after each line:

   ```
   cd /etc/conf/bin
   ./idbuild -B
   ```

   Status message appears.

2. When the kernel has been built, type the following and press **Enter** after each line **(0 in -g0 is zero, not the letter O)**:

   ```
   cd /etc/conf/cf.d
   cp unix /stand/unix
   cd /
   shutdown -g0
   ```

3. Type **y** and press **Enter** when the computer asks if you really want to shut down. **System is Down** should appear on the screen.

The UnixWare kernel is now ready for host adapter operation.

Booting the New Kernel

1. Follow the onscreen instructions (usually by pressing Enter) to reboot your computer.
2. Check the bootup messages to verify that all your installed SCSI devices are listed. If some or all f your SCSI devices do not appear at this time your SCSI cables may be loose, or the SCSI device setup may not be complete. Refer to your computer's troubleshooting and SCSI configuration documentation.
3. Wait for UnixWare to complete bootup with the new kernel.

The updated driver for UnixWare should now be ready to use.

2.6.5 Using Tunable Parameters

For UnixWare, some parameters are defined in the following files:

/etc/conf/pack.d/adslo/space.c (for UnixWare 1.x)
/etc/conf/pack.d/adsl/space.c (for UnixWare 2.x)

These parameters can be tuned for the *adsl* and *adslo* drivers. Refer to the comments in the appropriate *space.c* file for a description of these parameters. After modifying the *space.c* file, you must rebuild the kernel for the new parameters to take effect.

NOTE: *The adsl and adslo drivers support tagged queuing and reinitialization.*

2.6.6 Using Multiple Host Adapters

When using multiple host adapters, consider the following:

- When installing UnixWare 1.x and multiple host adapters, make sure all PCI channels are set to IRQ 10. All 7800 Family host adapters must use IRQ 10 and will not work with other IRQs. When installing UnixWare 2.x, any IRQ can be used.

NOTE: *When initial installation of UnixWare is complete, the IRQs can be changed to another supported IRQ as long as there are no conflicts with the IRQ of another host adapter. The IRQ in the CMOS setup must correspond to the IRQ in the configuration table.*

- The host adapter and computer must be configured for multiple host adapters as explained in the host adapter's *User's Guide*.
- To boot from the AIC-7880 host adapter, set the host adapter to the lowest PCI **Device number**. See your host adapter's **User's Guide**.
- For UnixWare 1.x: If you skip a host adapter in a PCI slot, disable the host adapter BIOS (see your host adapter's *User's Guide*). Enable the channel in the *sdevice.d* file by selecting **Y** at the line **/etc/conf/sdevice.d/adsl**.
- UnixWare 2.x supports auto-configuration. When adding multiple host adapters to an existing UnixWare 2.x system, simply install the board and reboot; the system automatically reconfigures and rebuilds the kernel. If you want to choose a host adapter to boot from, simply disable the BIOS on all other host adapters.

2.6.7 Removing the Driver

If you no longer need the *adsl* or *adslo* driver, you can use the following procedure to remove it completely:

1. Back up all important computer files.
2. For UnixWare 2.x: At the UnixWare root prompt, type the following:

   /etc/conf/bin/idinstall -d adsl

   These files will be deleted:

   /etc/conf/mdevice.d/adsl
   /etc/conf/pack.d/adsl/Driver.0
   /etc/conf/pack.d/adsl/space.c
   /etc/conf/pack.d/adsl/disk.cfg

/etc/conf/sdevice.d/adsl

For UnixWare 1.x: At the UnixWare root prompt, type the following:

```
/etc/conf/bin/idinstall -d adslo
```

These files will be deleted:

```
/etc/conf/mdevice.d/adslo
/etc/conf/pack.d/adslo/Driver.0
/etc/conf/pack.d/adslo/space.c
/etc/conf/pack.d/adslo/disk.cfg
/etc/conf/sdevice.d/adslo
```

3. Then rebuild the kernel (0 in -g0 is zero, not the letter O):

```
/etc/conf/bin/idbuild -B -K
cp /etc/conf/cf.d/unix /unix
cd /
shutdown -g0
```

4. Reconfigure your computer for your alternate or replacement drive controller, and reboot the computer.